

Analyzing the driving factors for Electric Vehicle (EV) adoption in Municipal Cities: lessons learned from the world, for application in City of Toronto

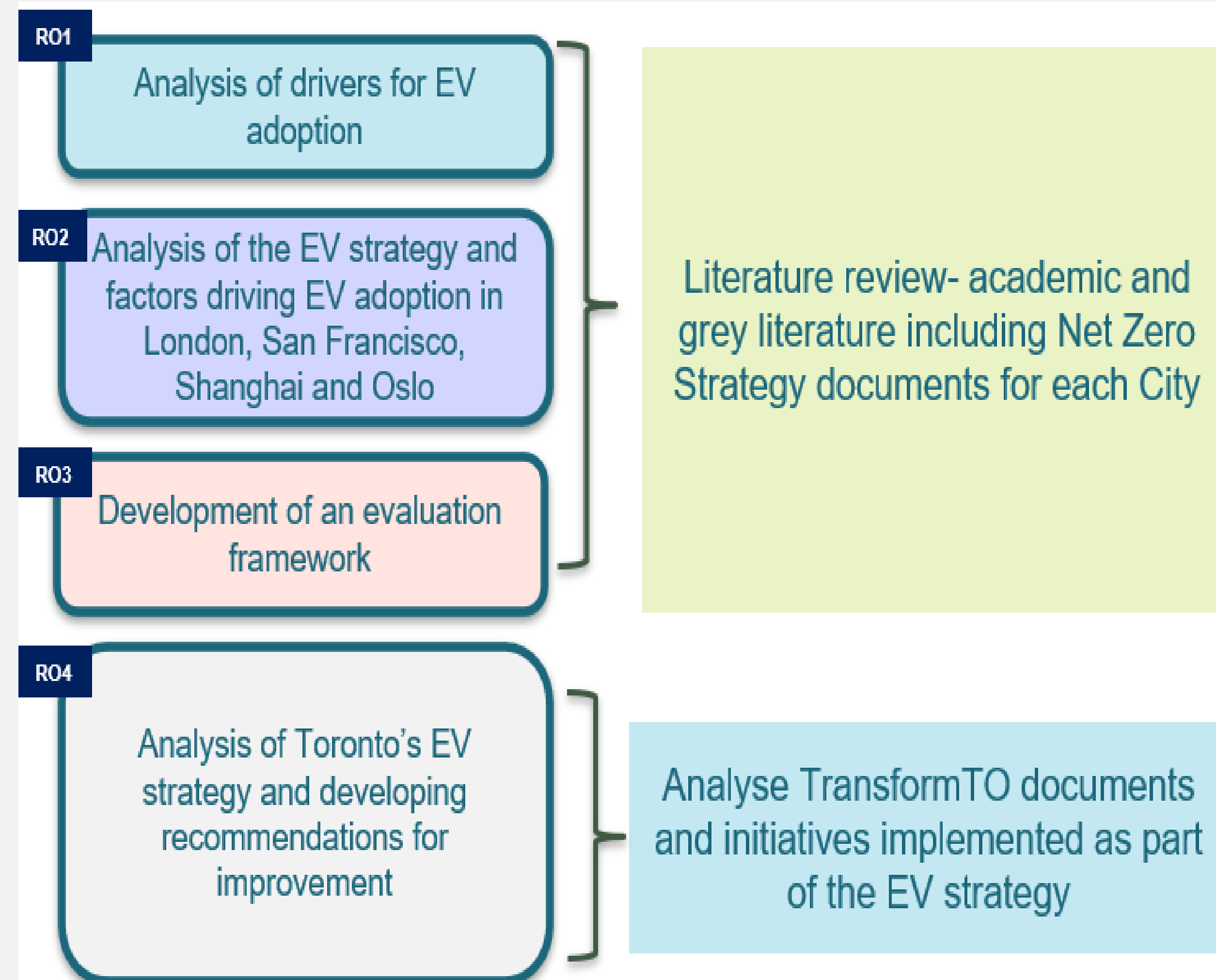


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Background

The City of Toronto's Climate Action Plan has TransformTO target that **30% of the registered vehicles in the City of Toronto should be electric by 2030**. The current adoption rate in Toronto is not as high as other cities around the world. For this research paper an evaluation framework was developed based on the success factors observed in Cities around the world and recommendations were determined.

Research Methods



Key findings

Oslo-

- EV related targets and policies implemented in Norway since 1990's
- 25% exemption from Value Added Tax (VAT) on purchase of EVs with complete
- 100% toll waived for EV owners
- Preferential parking with EV chargers
- Access to High Occupancy Vehicles lanes

Key findings

Shanghai

- A city level target of annual sale of new EVs by 2030
- National level tax exemption offered for EVs
- Reservation of 10% of the public parking spaces for parking and EV charging
- Financial assistance for charging infrastructure

San Francisco

- Federal level, state level and city level EV target
- Funding and incentives for purchasing EVs Policies for preferential parking
- Emissions standards for ICE cars
- EV charging infrastructure subsidy
- Community engagement and equitable accessibility

London

- 100% tax exemption for vehicle tax
- Subsidies for EV charging infrastructure
- Streetlamps converted to charging points for on-street parking
- Ultra Low Emission Zone- emission inspection fee for ICE vehicles
- Government targets for EVs, national and city-level net zero strategy

Evaluation of City of Toronto

Performing well in the following areas:

- EV related target and commitment
- Access to HOV lanes and green license plate
- Incentives for EV charging infrastructure
- Reduced operating cost for EVs
- Equitable accessibility to incentives

Can perform better for following:

- Incentives for EV manufacturers
- Policies for preferential parking for EVs
- Community awareness on EV benefits
- Availability of public charging infrastructure
- Technological advancements to convert existing infrastructure into EV charging points
- Emission inspection fee for ICE

Major gaps found in:

- Financial incentives to purchase EV
- Exemption from vehicle related taxes for EV
- Emission Standards for vehicles
- Reduction in GHG emissions

Recommendations for Toronto

- ✓ A flexible funding approach for EV charging infrastructure
- ✓ Community engagement and involvement through EV taskforce
- ✓ Introduce a low emissions zone in certain parts of the city
- ✓ City of Toronto must lobby for additional funding for:
 - Public charging infrastructure
 - Incentives to purchase EV
 - Exemption from vehicle related taxes

Key References

- Aasness, M. A., & Odeck, J. (2015). The increase of electric vehicle usage in Norway—Incentives and adverse effects. *European Transport Research Review*, 7(4), Article 4. <https://doi.org/10.1007/s12544-015-0182-4>
- Berliner, R. M., Hardman, S., & Tal, G. (2019). Uncovering early adopter's perceptions and purchase intentions of automated vehicles: Insights from early adopters of electric vehicles in California. *Transportation Research Part F: Traffic Psychology and Behaviour*, 60, 712–722. <https://doi.org/10.1016/j.trf.2018.11.010>
- Bjerkan, K. Y., Nørbech, T. E., & Nordtømme, M. E. (2016). Incentives for promoting Battery Electric Vehicle (BEV) adoption in Norway. *Transportation Research Part D: Transport and Environment*, 43, 169–180. <https://doi.org/10.1016/j.trd.2015.12.002>
- How to build an electric vehicle city: Deploying charging infrastructure. (n.d.). Retrieved December 17, 2023, from https://www.c40knowledgehub.org/s/article/How-to-build-an-electric-vehicle-city-deploying-charging-infrastructure?language=en_US
- Ingeborgrud, L., & Ryghaug, M. (2019). The role of practical, cognitive and symbolic factors in the successful implementation of battery electric vehicles in Norway. *Transportation Research Part A: Policy and Practice*, 130, 507–516. <https://doi.org/10.1016/j.tra.2019.09.045>

EV strategy evaluation framework

Category	Evaluation metric	Relative importance of the metric
Political	EV related commitments/targets taken by government	High
	Incentives introduced by the government in the form of toll waivers, preferential access for license plates and driving lanes for EVs	Medium
	Incentives for EV manufacturers	Medium
	Policies for preferential parking and charging for EVs in public and residential zones	Medium
Economical	Financial Incentives to purchase EV	High
	Exemption from various vehicle related taxes	Medium
	Incentives for EV charging infrastructure	High
	Reduced operating cost for EVs compared to ICEVs	Low
Social	Community awareness on EV benefits	Low
	Equitable accessibility of EV infrastructure	High
Technological	Availability of public charging infrastructure	High
	Technological advancements to convert existing infrastructure into charging point- eg pole mounted charging points	Medium
Environmental	EVs contributing to reduction in air pollution and emissions	Low
Legal	Emissions Standards for vehicles	Medium
	Emission inspection fee for vehicles	Medium